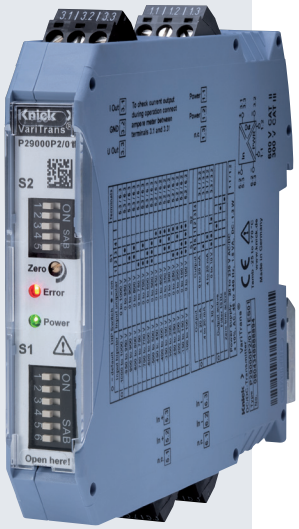
VariTrans P 29000

Compact high-voltage isolators with safe galvanic isolation, VariPower broad-range power supply and genuine calibrated range selection.



The Task
When it comes to taking measurements on power electronics, unipolar or bipolar voltage signals ranging from 20 mV to 1000 V must be galvanically isolated and converted to standard ±20 mA, ±10 V, or 4 … 20 mA output signals.

The Problems
Room in the enclosure is limited and expensive. Therefore great value is placed on the miniaturization of automation components. And high safety requirements with regard to the protection of persons and systems must also be met.

The Solution
The VariTrans P 29000 isolator series is designed specifically to measure voltages up to 1000 V AC/DC. The test voltage is 5.4 kV AC. Protection against electric shock is achieved through protective separation according to EN 61140 between input and output and power supply.

Compact automation solutions can be implemented thanks to the 17.5 mm modular housing and operation at temperatures up to 70 °C.

The Housing
With a width of only 17.5 mm, the modular housings of the P 29000 series strike an optimum balance between compact design and safety. The relevant safety standards are reliably met.
For direct measurement of the output current, the device features test jacks which enable measurement of output current and voltage; the output circuit doesn't have to be interrupted to do so.

The Advantages
The measuring ranges of the VariTrans P 29000 are adjusted via DIP switches on the front side of the modular housing. Calibrated switching is controlled by a microcontroller. This makes for very easy configuration requiring neither calibrators nor other measuring equipment. The user can select from up to 192 switchable calibrated ranges.

In addition to the active current or voltage output, a passive current output allows for connection to active PLC inputs. LEDs indicate proper functioning or possible fault conditions, such as exceeding of the allowable load voltage at the output. The simple implementation of special measuring ranges supports solutions tailored to your application. An optional RangeLimit function lets you set lower and upper output limits on the isolation amplifiers.
In addition, versions with full-wave rectifiers in the signal path are available. The output can be inverted by the user. A connectable potentiometer enables zero point adjustment of up to 5 % on the measuring section.

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Warranty
5 years!

Warranty
Defects occurring within 5 years from delivery date shall be remedied free of charge at our plant (carriage and insurance paid by sender).

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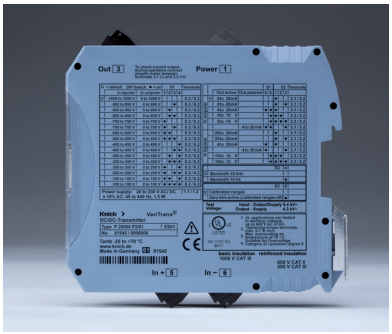
The Technology

In the VariTrans P 29000 series, the circuit design and device construction ensure excellent transmission quality which is reflected in the zero point stability, linearity, long-term stability, frequency response and immunity to interference.

Thanks to the high cut-off frequency of the devices, the signal form on the input is reproduced on the output without distortion. Fast changes in the input signal are converted almost without delay into a corresponding change in the output signal.



The Facts

– **Universal usability:**
20 mV to 1000 V input

– **Working voltages**
up to 1000 V AC/DC

– **Protective separation**
according to EN 61140 – protection of the maintenance staff and subsequent devices against excessively high voltages up to 600 V AC/DC

– **Test voltage**
5.4 kV AC across input and output / power supply
4.3 kV AC across power supply and output

– **Outstanding transmission properties:**
  – Gain error 0.2 %
  – Cutoff frequency > 10 kHz
  – Response time T99 < 200 µs
  – High output power:
    12 V (current output),
    10 mA (voltage output)

– **High immunity to transient common-mode interference:**
T-CMR >100 dB

– **Exceptional flexibility**
due to calibrated range selection; reduced number of product variants minimizes inventory costs

– **World-wide usability**
with VariPower broad-range power supply 20 V to 230 V AC/DC ±10 %; reliable function even with unstable supply

– **No damage**
in the case of erroneous power connection

– **Passive current output**
Additional passive current output allows for connection of active PLC inputs

– **Output inversion**
switchable

– **Rectifier in signal path**
(absolute-value forming); optional

– **RangeLimit,**
adjustable lower or higher limit at output; optional

– **Test jacks**
for measuring output current and voltage

– **Low space consumption**
in enclosure with only 17.5 mm wide modular housing

– **Low-cost installation**
Quick mounting, convenient connection of the power supply through DIN rail bus connectors (in the case of 24 V DC supply)

– **5-year warranty**

VariTrans P 29000

Measuring Ranges

VariTrans P 29000 – Standard device ranges

Input, bipolar	Output, active	Output, passive
–1000 ... 1000 V	–20 ... 20 mA	4 ... 20 mA
–950 ... 950 V	20 ... –20 mA	
–900 ... 900 V	4 ... 20 mA	
–800 ... 800 V	–10 ... 10 V	
–750 ... 750 V	10 ... –10 V	
–700 ... 700 V		
–600 ... 600 V		
–500 ... 500 V		
–450 ... 450 V		
–400 ... 400 V		
–350 ... 350 V		
–300 ... 300 V		
–250 ... 250 V		
–200 ... 200 V		
–150 ... 150 V		
–100 ... 100 V		

Input, unipolar	Output, active	Output, passive
0 ... 1000 V	0 ... 20 mA	4 ... 20 mA
0 ... 950 V	0 ... –20 mA	
0 ... 900 V	4 ... 20 mA	
0 ... 800 V	0 ... –10 V	
0 ... 750 V	0 ... 10 V	
0 ... 700 V		
0 ... 600 V		
0 ... 500 V		
0 ... 450 V		
0 ... 400 V		
0 ... 350 V		
0 ... 300 V		
0 ... 250 V		
0 ... 200 V		
0 ... 150 V		
0 ... 100 V		

VariTrans P 29001 – Standard device ranges

Input, bipolar	Output, active	Output, passive
–100 ... 100 V	–20 ... 20 mA	4 ... 20 mA
–80 ... 80 V	20 ... –20 mA	
–60 ... 60 V	4 ... 20 mA	
–50 ... 50 V	–10 ... 10 V	
–30 ... 30 V	10 ... –10 V	
–20 ... 20 V		
–10 ... 10 V		
–5 ... 5 V		
–300 ... 300 mV		
–200 ... 200 mV		
–150 ... 150 mV		
–120 ... 120 mV		
–100 ... 100 mV		
–90 ... 90 mV		
–60 ... 60 mV		
–30 ... 30 mV		

Input, unipolar	Output, active	Output, passive
0 ... 100 V	0 ... 20 mA	4 ... 20 mA
0 ... 80 V	0 ... –20 mA	
0 ... 60 V	4 ... 20 mA	
0 ... 50 V	0 ... –10 V	
0 ... 30 V	0 ... 10 V	
0 ... 20 V		
0 ... 10 V		
0 ... 5 V		
0 ... 300 mV		
0 ... 200 mV		
0 ... 150 mV		
0 ... 120 mV		
0 ... 100 mV		
0 ... 90 mV		
0 ... 60 mV		
0 ... 30 mV		

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Product Line

VariTrans P 29000 P2

Order No.			**P 29000 P2 /**	**0**	□	–	□	□	□	□
	24 V	Standard device			**0**					
	Broad range	Standard device			**1**					
	Variant	Customer-specific					**n**	**n**	**n**	**n**

VariTrans P 29001 P2

Order No.			**P 29001 P2 /**	**0**	□	–	□	□	□	□
	24 V	Standard device			**0**					
	Broad range	Standard device			**1**					
	Variant	Customer-specific					**n**	**n**	**n**	**n**

Special versions

Shunt break detection (for P29001 only)	(In case of an open input, the output will be at maximum.)
Absolute-value function	(The output cannot be negative.)
RangeLimit	(A lower or upper limit value can be specified for the output range.)

All special versions apply to all measuring ranges.
Current inputs on request.

Accessories		**Order No.**
IsoPower A 20900	Power supply	**A 20900 H4**
DIN rail bus connector	for tapping of supply voltage (2 units required if on right side of IsoPower A 20900)	**ZU 0678**
Power terminal block	for 24 V DC, dual supply	**ZU 0677**

Specifications

Input data

Input range	Max. ± 1000 V DC	
Overload capacity (permanent)	0 … 1 V	max. ±30 V
	1 … 100 V	max. ±500 V
	100 … 500 V	max. ±600 V
	500 … 1000 V	max. ±1200 V
Input resistance	0 … 1 V	approx. 10 kohms
	1 … 100 V	approx. 400 kohms
	100 … 500 V	approx. 2 Mohms
	500 … 1000 V	approx. 4 Mohms
Shunt break detection (opt.)	< 300 µA	

VariTrans P 29000

Specifications *(continued)*

Output data			
Output, active	0/4 … 20 mA or 0 … 10 V, resp., or –20 … 20 mA or –10 … 10 V, resp.		
Output, passive	4 … 20 mA		
Offset	Default ±150 %		
Max. load with: Current Voltage	Active: ≤ 12 V (600 ohms at 20 mA) Passive: 12 ... 26 V ≤ 10 mA (1 kohm at 10 V)		
Overload range	Current output: Voltage output:	> 22 mA (26 V) < 15 V	
Overload capacity with externally applied voltage	±30 V		
Offset adjustment range	±5 %		
Residual ripple	< 10 mV_{rms}		
Voltage drop when measuring the output current at test jacks 3.1 and 3.3	Max. 150 mV		
Transmission behavior			
Gain error	Input ≤ 1 V Input > 1 V	≤ 0.1 % meas. val. ≤ 0.2 % meas. val.	
Offset	≤ 0.1 % full scale		
Linear dynamic range	–5% to 105% of input span		
Overload indication	Red LED on the front		
Load error indication	Red LED on the front		
Response time T_{99}	< 200 ms or < 200 µs		
Cutoff frequency	10 Hz or 10 kHz		
Common-mode rejection ratio	Input range ≤ 1 V Input range > 1 V	CMRR[1)] T-CMRR[2)] CMRR[1)]	approx. 150 dB (DC/AC: 50 Hz) approx. 115 dB (1000 V, tr = 1 µs) DC: approx. 150 dB AC 50 Hz: approx. 120 dB
Temperature influence[3)]	Input ≤ 1 V Input > 1 V	≤ 50 % full scale ≤ 80 % full scale	
Power supply			
Power supply	P2900XP2/00 P2900XP2/01	24 V DC +/–25 % 20 … 230 V AC/DC +/–10 %; AC: 45 Hz to 440 Hz	
Power consumption	1.5 W		

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Specifications *(continued)*

Isolation

Galvanic isolation	3-port isolation between input, output and power supply
Test voltage	5.4 kV AC across input and output / power supply 4.3 kV AC across power supply and output
Basic insulation acc. to EN 61010-1:2001 for circuits of CAT II and CAT III	Working voltage CAT II: 1000 V AC/DC CAT III: 1000 V AC/DC
Reinforced insulation acc. to EN 61010-1:2001 for circuits of CAT II and CAT III	Working voltage CAT II: 600 V AC/DC CAT III: 300 V AC/DC
Insulation acc. to UL 508 und C22.2 No. 14 – 2010 standards	Working voltage CAT III: 600 V AC/DC

Standards and approvals

EMC[4)]	Product standard EN 61326-1 Emitted interference: Class B Immunity to interference: Industry
USA / Canada, UL.	cULus Listed, Industrial Control Equipment. File: E220033, Standard: ANSI/UL 508, Standard Canada: C22.2 No. 14 - 2010

Further data

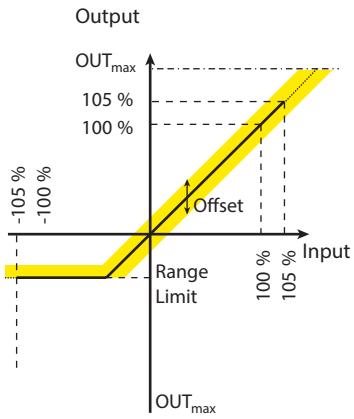
Ambient temperature	Operation: –25 … +70 °C (min. start temp: –40 °C) Operation with passive output: –25 … +60 °C Transport and storage: –40 … +85 °C
Design	Modular housing with screw terminals Housing width: 17.5 mm
Diameter of test jacks	2.1 mm
Ingress protection	Housing: IP 40, terminals: IP 20
Ambient conditions	Stationary operation, weatherproof Relative humidity: 5 … 95 %, no condensation Barometric pressure: 790 … 1060 hPa (at p0=1013 hPa: Height: 0 … 2000 m) The allowable working voltages are reduced for heights > 2000 m. Water or wind-driven precipitation (rain, snow, hail, etc.) precluded
Mounting	With snap-on mounting for 35-mm top-hat rail according to EN 60715
Weight	Approx. 120 g
Accessories	DIN-rail bus connector ZU 0678 Power supply A20900H4 Power terminal block ZU 0677

[1)] Common-Mode Rejection Ratio = Differential voltage gain : Common-mode voltage gain
[2)] Transient Common-Mode Rejection Ratio = Differential DC gain : Common-mode transient peak value gain
[3)] Reference temperature for TC specifications = 23 °C, average TC
[4)] Slight deviations are possible while there is interference

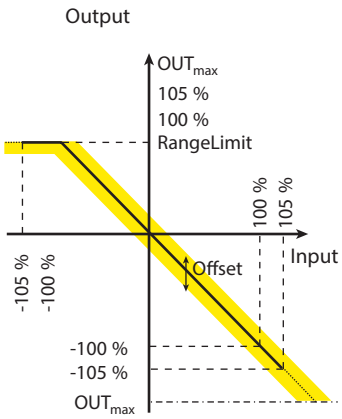
VariTrans P 29000

Characteristic Curves

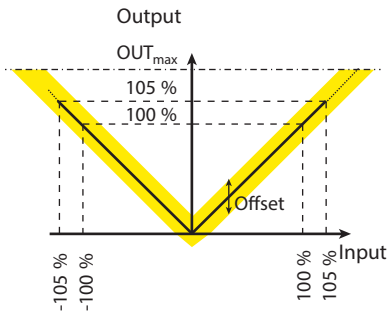
Normal characteristic with adjustable RangeLimit (min) and adjustable offset



Inverse characteristic with adjustable RangeLimit (max) and adjustable offset



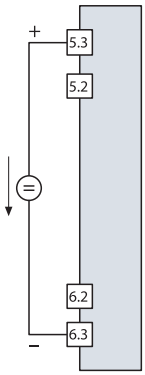
Built-in full-wave rectifier with absolute-value function (V-shape curve) and adjustable offset



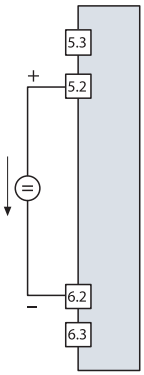
Typical Wiring Diagrams

Typical wiring diagrams (input)

VariTrans P 29000:
500 … 1000 V
VariTrans P 29001:
0 … 100 V

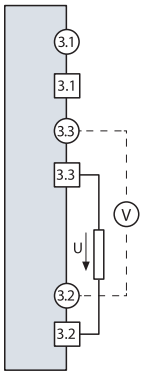


VariTrans P 29000:
100 … 500 V
VariTrans P 29001:
0 … 300 mV

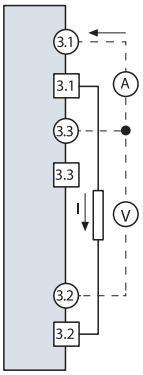


Typical wiring diagrams (output)

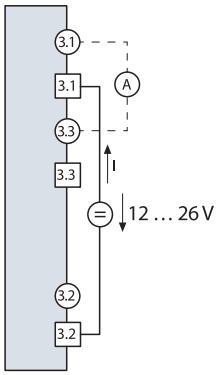
Voltage output with opt. measurement



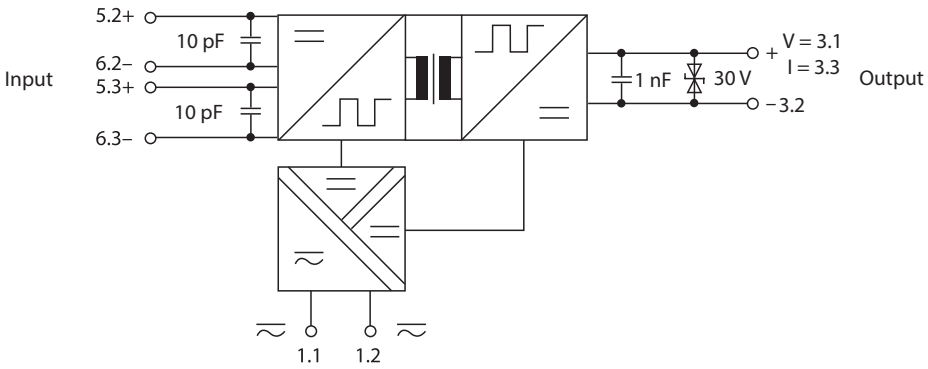
Current output, active, with opt. measurement



Current output passive, with opt. measurement

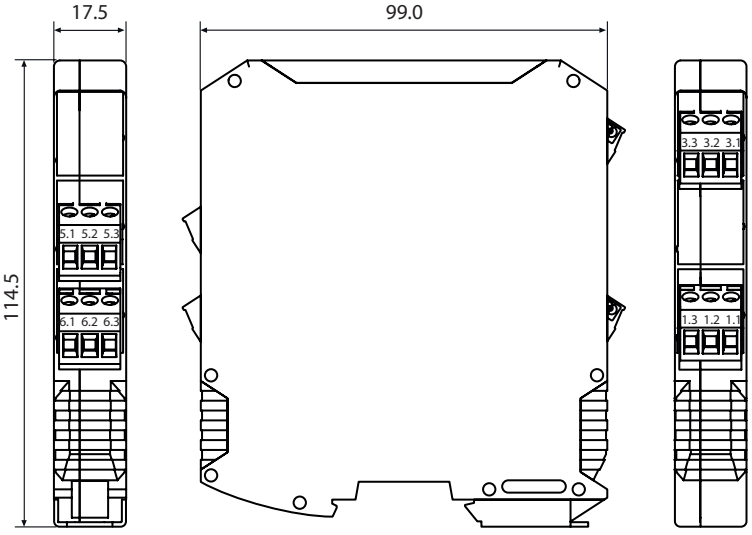


Block Diagram



Power supply 20 … 230 V AC/DC

Dimension Drawings and Terminal Assignments



1.1	Power Supply	1.2	Power Supply	1.3	Not connected
3.1	Current output (passive/active)	3.2	GND output	3.3	Voltage output
5.1	Not connected	5.2	Positive input	5.3	Positive input
6.1	Not connected	6.2	Negative input	6.3	Negative input

All dimensions in mm